CLAIMS

What is claimed is:

1. An apparatus for detecting an object in a cargo trailer comprising:

a sensor mounted along a first wall of the trailer, the sensor having a pair of ultrasonic transducers having multiple operation modes with different ranges, with at least one operation mode scanning an area of the cargo trailer adjacent a distal end of the trailer from the first wall on which the sensor is mounted;

a trailer tracking control unit connected to the sensor, the control unit controlling the sensor and receiving data from the sensor; and

a power source electrically connected to the sensor.

2. The apparatus of claim 1, wherein the multiple operation modes include short range mode, long range mode, and proximity mode.

3. The apparatus of claim 2, wherein area scanned by the long range mode extends from 10 to 63 feet.

4. The apparatus of claim 2, wherein area scanned by the long range mode includes a loading door wall of the cargo trailer.

5. The apparatus of claim 4, further comprising an amplifier for amplifying signal of at least of the ultrasonic transducers to make up for atmospheric absorption.

6. The apparatus of claim 5, further comprising at least one sensor sensing an atmospheric condition.

7. The apparatus of claim 6, wherein the atmospheric condition is at least one of air temperature and air humidity.

8. The apparatus of claim 2, wherein area scanned by the short range mode includes a floor of the cargo trailer.

9. The apparatus of claim 2, wherein area scanned by the short range mode extends from 4 to 20 feet.

10. The apparatus of claim 2, wherein scanning is performed continuously in the proximity mode.

11. The apparatus of claim 10, wherein area scanned by the proximity mode extends from 0 to 4 feet.

12. The apparatus of claim 2, wherein one transducer is used for the short range mode and for the proximity mode.

13. The apparatus of claim 12, wherein the one transducer operates periodically when operating in the short range mode.

14. The apparatus of claim 13, wherein the one transducer operates continuously in the proximity mode when not operating in the short range mode.

15. The apparatus of claim 12, further comprising control electronics for lowering output power of the one transducer when it operates in the proximity mode.

16. The apparatus of claim 1, further comprising a control unit adapted to communicate with a central system.

17. The apparatus of claim 16, wherein the control unit uses signals detected in the multiple operation modes to detect presence or absence of cargo in the cargo trailer.

18. The apparatus of claim 1, wherein the sensor is mounted flush with a nose wall of the trailer.

19. The apparatus of claim 1, wherein at least one ultrasonic transducer is a long range transducer which comprises an ultrasonic transmitter and an ultrasonic receiver.

20. The apparatus of claim 19, wherein the transmitter and the receiver are mounted at the base of a pair of parabolic cones.

21. The apparatus of claim 1, wherein at least one ultrasonic transducer is a short range mode transducer which comprises an ultrasonic transmitter and an ultrasonic receiver.

22. The apparatus of claim 21, wherein the transmitter and receiver are mounted pointing downward towards floor of the trailer.

23. An apparatus for detecting an object in a trailer comprising:

a long-range sensor mounted along a nose wall of the trailer;

an atmospheric absorption compensation module connected to the sensor; and

a power source electrically connected to the sensor.

24. The apparatus of claim 23, wherein the atmospheric absorption compensation module further comprises at least one sensor sensing an atmospheric condition.

25. The apparatus of claim 24, wherein the atmospheric condition is at least one of air temperature and air humidity.

26. The apparatus of claim 23, wherein the atmospheric absorption compensation module further comprises controls for amplifying sensor signal.

27. The apparatus of claim 23, wherein the atmospheric absorption compensation module further comprises a processor for calculating effects of atmospheric absorption on ultrasonic signal.

28. An apparatus for detecting an object in a cargo trailer comprising:

a sensor mounted along a first wall of the cargo trailer, the sensor comprising

a first ultrasonic transducer operating in a long range mode that scans out to an area adjacent a second wall, of the trailer, the rear wall being opposite and distal of the first wall, and

a second ultrasonic transducer adapted to operate in a short range mode and in a proximity mode;

a control module for controlling operation of the sensor; and

a power source electrically connected to the sensor and the control module.

29. The apparatus of claim 28, wherein range of area scanned in the proximity mode is from 0 to 4 feet.

30. The apparatus of claim 28, wherein the second ultrasonic transducer operates at lower power when operating in the proximity mode.

31. The apparatus of claim 28, wherein the second ultrasonic transducer operates in the short range mode periodically.

32. The apparatus of claim 31, wherein the second ultrasonic transducer continuously operates in the proximity mode when not operating in the short range mode.